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page**

**[54] Title of invention: A method of preparing
liquefied fish protein powder**

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[57] Abstract

The present invention relates to a method of preparing liquefied fish protein powder using the enzyme hydrolysis process and fish as the raw material. In the said method, after demersal fish is made into fish powder, it is placed into an extraction tank and degreased. Then the appropriate amount of water and neutral proteinase are added to the degreased fish powder and it undergoes hydrolysis and filtration. Then the filtrate undergoes vacuum concentration and spray drying to obtain liquefied fish protein powder. The said product is easily soluble in water and comprises more than 20 amino acids and many kinds of mineral substances and trace elements. Moreover, the essential amino acid composition is complete and rich in content. It can be used to make infant nutrition fish paste, complete nutrients, and amino acid capsules, and it can also be used to make high-grade nutrition marine seasonings.

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CLAIMS

1. A method of preparing liquefied fish protein powder, it being characterized by the fact that demersal fish is first decapitated, dressed, and made into fish powder. Then it is placed into an extraction tank, an inert solvent is added, and it is degreased. Water and neutral proteinase are added to the degreased fish powder and it undergoes hydrolysis and filtration. After filtering, activated carbon comprising 70-75 percent of the solid content of the filtrate is added to the filtrate and it undergoes decolorization and deodorization. The decolorized and deodorized filtrate is placed in a vacuum and concentrated until the solid content is 40-45 percent. Finally, the concentrate is dried in a pressure spray drying oven to obtain white or light yellow liquefied fish protein powder.

2. The method of preparing liquefied fish protein powder as described in claim 1, that is characterized by the fact that the described inert solvent is petroleum ether, the amount added is 1 to 1.5 times the weight of the fish powder, the degreasing and extraction time is 0.2 to 1 hours, and the temperature is controlled at below the boiling point.

3. The method of preparing liquefied fish protein powder as described in claim 1 or claim 2, that is characterized by the fact that while hydrolyzing, the added water is 8 to 10 times the weight of the fish powder, the proteinase is plant proteinase, the amount added comprises 0.2 to 1 percent of the solid content, the hydrolysis temperature is 40 to 80°C, and the time is 2 to 10 hours.

SPECIFICATION

A Method of Preparing Liquefied Fish Protein Powder

The present invention relates to a protein hydrolysate method. In detail, it is a method of using the enzyme hydrolysis process and sea fish as the raw material to obtain liquefied fish protein powder with very high solubility.

Experiments have proven that fish meat contains 8 essential amino acids that are required by the human body. The essential amino acid ratio is reasonable and, in comparison to livestock meat, fish meat has less connective tissue, softer flesh, and a high lysine and calcium content. At present, China's hydrolyzed protein uses mainly plant protein such as soybean dregs and peanut dregs or animal blood for its raw materials. However, there are three forms of hydrolyzed protein that are made from raw materials such as ocean aquatic products or deep sea fish in overseas countries such as the United States and Japan, i.e., concentrated fish protein, functional fish protein, and liquefied fish protein. Since liquefied fish protein has advantages such as being easily soluble in water and having a rich content of amino acids and short peptides, it has wide applications. However, the hydrolysis method for liquefied fish protein is different, and the constituents and characteristics of the fish protein that is prepared and produced also differ somewhat.

At present, the protein hydrolysis methods are mainly alkaline hydrolysis, acid hydrolysis, and enzyme hydrolysis. In alkaline hydrolysis, while the hydrolysis rate is higher, the structures and configurations of most of the amino acids are damaged, which loses the physiological effect. While acid hydrolysis does not damage the configuration, tryptophan is an unstable acid, acid hydrolysis has to use sodium hydroxide to neutralize, and it generates too much sodium chloride. Even if desalinized, the sodium amide content is still quite high (5 percent), which limits its applications.

The object of the present invention is to provide a method of preparing liquefied fish protein powder with the use of biological enzyme hydrolysis. The prepared liquefied fish protein powder not only is easily soluble in water, but also comprises a high content of amino acids and short peptides and many kinds of mineral substances and trace elements.

The method of preparing liquefied fish protein powder is carried out in the following steps: In Step 1, first decapitate, dress, and make demersal fish into fish powder, and then place it in an extraction tank, add an inert solvent at a weight ratio of fish powder to inert solvent of 1:1 to 1:5, and degrease. The extraction time is 0.5 to 1 hours, and the temperature is controlled at below the boiling point. In Step 2, add the degreased fish powder to water and neutral proteinase and perform hydrolysis and filtration. Wherein the added water comprises 8 to 10 times the fish powder, the neutral proteinase comprises 0.3 to 0.8 percent of the solid content, the hydrolysis temperature is 40 to 80°C, and the time is 2 to 10 hours. In Step 3, add the filtered filtrate to activated carbon and decolorize and deodorize, wherein the quantity of activated carbon used is 70 to 75 percent of the solid content. In Step 4, place the decolorized and deodorized filtrate into a vacuum and concentrate until the solid content is 40 to 45 percent. Finally, dry the concentrate in a pressure spray drying oven to make white or light yellow liquefied fish protein powder.

Liquefied fish protein powder prepared with the use of the above described method is easily soluble in water, has a high nutritional value, comprises more than 20 amino acids, has a complete essential amino acid composition, is rich in content, and comprises many kinds of mineral substances and trace elements. Its solubility characteristics (solubility, wettability, dispersivity, and dissolution rate) are superior to sucrose and milk powder, and its products have a good distinctive flavor. It can be used to make products such as infant nutrition fish paste, complete nutrients, amino acid capsules, and sports drinks, and it can also be used to make high grade nutrition marine seasonings. It is comparable to the standards of the US Food Chemistry Code (FCC,

1983), and its physicochemical properties all meet or exceed its standards. See the attached table.

Physicochemical Properties of Liquefied Fish Protein Powder

Item		This Product's Standards	FCC Standards
Total Protein	(%)	>80.0	>52.0
Fat	(%)	<2.0	
Amino Acid Nitrogen	(%)	>2.0	>2.0
Solubility	(%)	>99.0	>99.0
Glutamate (calculated as $C_5H_9NO_4$, %)		<15.0	<20.0
Aspartic Acid (calculated as $C_4H_7NO_4$, %)		<10.0	<15.0
Ash Content	(%)	<5.0	

The drawing is the flow chart of the present invention.

In combination with the drawing shown, the embodiment below provides a further explanation of the present invention.

See drawing. As in the flow chart of the present invention, decapitate, dress, wash, and mince ocean demersal fish. Then dry and make into fish powder. Place the fish powder in an extraction tank, add an equal quantity of petroleum ether solvent, control the temperature at below the boiling point, and extract for 0.5 to 1 hours to obtain degreased fish powder.

Then place the degreased fish powder in a hydrolysis tank, add water equal to 9 times the fish powder, stir well, maintain the temperature at 60° to 70°C, add neutral proteinase comprising 0.5 percent of the solid content, and hydrolyze for 6 to 8 hours. Then reheat to 80°C, perform enzyme removal, and stir.

Put the filtered filtrate into a decolorizing tank, add activated carbon, then heat to 90° to 95°C, maintain the temperature for approximately 0.5 hours, recool to 50°C, and filter. Wherein the quantity of the activated carbon used comprises 75 percent of the solid content of the filtrate.

Then put the decolorized and deodorized filtrate into a vacuum concentrator and concentrate until the solid content is 45 percent. While concentrating, the vacuum degree is 0.08Mpa and the steam pressure is 0.15Mpa.

Finally, use a pressure spray drying oven to spray dry the concentrate. The spray pressure is 15Mpa, the intake temperature is 150°C, the exhaust temperature is 80°C, and the drying oven temperature is 82°C. After spray drying under the above described conditions, obtain liquefied fish protein powder.

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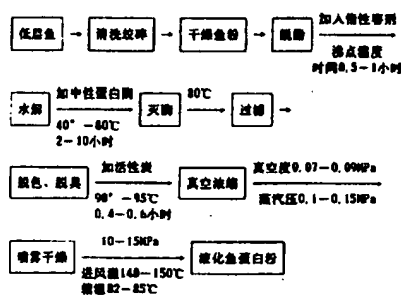
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[54]发明名称 一种液化鱼蛋白粉的制作方法

[57]摘要

本发明涉及一种以鱼为原料,采用酶法水解工艺制作液化鱼蛋白粉的方法。该方法将底层鱼制成鱼粉后放入提取罐中脱脂,然后将脱脂后的鱼粉加入适量的水 and 中性蛋白酶进行水解、过滤,再将滤液进行真空浓缩、喷雾干燥,即得到液化鱼蛋白粉。该产品易溶于水,含有二十多种氨基酸和多种矿物质及微量元素,且必需氨基酸组成全面,含量丰富,可用于制造婴儿营养鱼糊、全营养素、氨基酸胶丸,也可用来制造高级营养海鲜调味料。



权 利 要 求 书

1、一种液化鱼蛋白粉的制作方法，其特征在于：先将底层鱼去头去内脏制成鱼粉，然后放入提取罐中并加入惰性溶剂进行脱脂，脱脂后的鱼粉加入水 and 中性蛋白酶进行水解、过滤，过滤后的滤液再加入占滤液中固形物含量的70—75%的活性炭进行脱色脱臭，脱色脱臭后的滤液置于真空中浓缩至固形物含量为40—45%时止；最后将浓缩液经压力喷雾干燥箱干燥，即得白色或淡黄色液化鱼蛋白粉。

2、根据权利要求1所述的液化鱼蛋白粉制作方法，其特征在于：所述的惰性溶剂为石油醚，其加入量为鱼粉重量的1—1.5倍，脱脂提取时间为0.2—1小时，温度控制在沸点以下。

3、根据权利要求1或2所述的液化鱼蛋白粉的制作方法，其特征在于：水解时，其加入的水为鱼粉重量的8—10倍，蛋白酶为植物蛋白酶，其投入量为固形物含量的0.2—1%，水解温度40—80℃，时间2—10小时。

说 明 书

一种液化鱼蛋白粉的制作方法

本发明涉及蛋白质水解物的方法，具体地讲是一种以海水鱼为原料的、采用酶法水解工艺制取可溶性极强的液化鱼蛋白粉的方法。

实验证明：鱼肉中含有人体所需的8种必需氨基酸，必需氨基酸比例合理，与家畜肉相比，它的缔组织小，肉质松软，赖氨酸、钙含量高。目前，我国的水解蛋白主要以太豆粕、花生粕等植物蛋白或动物血液为原料，而在国外如日本、美国采用海洋中的水产品或深水鱼为原料制成水解蛋白已有三种形成，即浓缩鱼蛋白、功能鱼蛋白和液化鱼蛋白。由于液化鱼蛋白易溶于水，富含氨基酸和短肽等优点，故具有广泛的应用范围。但液化鱼蛋白的水解方法不同，其制作产生的鱼蛋白成份和特性也有所变化。

目前，蛋白质的水解方法主要有碱法水解、酸法水解和酶法水解。碱法水解虽然水解率较高，但大多数氨基酸的结构和构型受到破坏，失去生理作用。酸法水解虽然不破坏构型，但色氨酸对酸不稳定，且酸法水解需用氢氧化钠中和，产生大量氯化钠，即使脱盐，氯化钠含量也较高(5%)，限制了其应用范围。

本发明之目的在于提供一种利用生物酶水解制作液化鱼蛋白粉的方法，所制作的液化鱼蛋白粉不仅易溶于水，而且富含氨基酸和短肽以及多种矿物质、微量元素。

液化鱼蛋白粉的制作方法按下列步骤进行：第一步是先将底层鱼去头去内脏制成鱼粉，然后放入提取罐中并按重量比为鱼粉：惰性溶剂1：1~1.5加入惰性溶剂进行脱脂，提取时间0.5—1小时，温度控制在沸点以下。第二步是将脱脂后的鱼粉加入水 and 中性蛋白酶进行水解、过滤，其

中加入的水为鱼粉的8—10倍,中性蛋白酶为固形物含量的0.3—0.8%,水解温度40—80℃,时间2—10小时。第三步,将过滤后的滤液加入活性炭进行脱色脱臭,其中活性炭用量为滤液中固形物含量的70—75%。第四步:将脱色脱臭后的滤液置于真空中浓缩至固形物含量为40°—45%止。最后将浓缩液经压力喷雾干燥箱干燥,即可制成白色或淡黄色的液化鱼蛋白粉。

用上述方法制作的液化鱼蛋白粉,易溶于水,营养价值高,含有二十多种氨基酸,必需氨基酸组成全面,含量丰富,并且含有多种矿物质和微量元素,溶解特性(可溶性、可湿性、弥散性和溶解速度)优于蔗糖和奶粉,产品风味好,可用于制造婴儿营养鱼糊、全营养素、氨基酸胶丸、运动饮料等,也可用来制造高级营养海鲜调味料。它与美国食用化学法典(FCC, 1983)的标准相比,其理化指标均达到或超过其标准,见附表。

液 化 鱼 粉 蛋 白 理 化 指 标

项 目	本产品指标	FCC指标
总蛋白质 (%)	>80.0	>52.0
脂 肪 (%)	<2.0	
氨基酸态氮 (%)	>2.0	>2.0
溶 解 度 (%)	>99.0	>99.0
谷 氨 酸 (以 $C_5H_9NO_4$ 计, %)	<15.0	<20.0
天冬氨酸 (以 $C_4H_7NO_4$ 计, %)	<10.0	<15.0
灰 分 (%)	<5.0	

附图是本发明的工艺流程图。

下面结合附图所示的实施例对本发明作进一步的说明。

参见附图，本发明的工艺流程是将海洋中的底层鱼去头去内脏进行清洗、搅碎，然后干燥制成鱼粉；鱼粉放入提取罐中，加入等量的石油醚溶剂，温度控制在沸点以下，提取时间在0.5~1小时，得脱脂鱼粉。

接着将脱脂后鱼粉投入水解缸中，加入相当于鱼粉9倍的水，搅拌均匀，使温度升至60°—70℃，加入固形物含量为0.5%的中性植物蛋白酶进行水解，水解时间为6—8小时，然后再升温80℃灭酶、过滤。

将过滤后的滤液打入脱色缸中，加入活性炭，然后升温至90°—95℃，保持温度在0.5小时左右，再降至50℃过滤。其中活性炭用量为滤液中固形物含量的75%。

再将脱色脱臭后的滤液打入真空浓缩锅中浓缩，浓缩至固形物含量为45%止。浓缩时的真空度为0.08MPa，蒸汽压力为0.15MPa。

最后用压力喷雾干燥箱将浓缩液喷雾干燥；喷雾压力15MPa，进风温度150℃，排风温度80℃，干燥箱温度82℃。经上述条件的喷雾干燥后即得液化鱼蛋白粉。

说明书附图

